

Appeared in: *The Information Society*, 19(3), 257-270.

Also in: Barab, Kling, and Gray (Eds.) *Designing Virtual Communities in the Service of Learning*. Cambridge University Press.

## Community of Practice: A Metaphor for Online Design

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Acknowledgements: We thank Sasha Barab and Rob Kling for their helpful comments.

### Abstract

This paper examines four cases and identifies several issues associated with the concept of communities of practice. These cases describe different forms of communities of practice in various settings including consulting firms and legal firms. After introducing these cases, we address several issues emerged from these cases and the research literature. First, we caution against the tendency to romanticize the communities of practice construct and especially online communities. The cross-case analysis points to five problems that should be considered before developing an online community of practice. These five problems include: Prescriptive vs. Description Distinction; Ready-Made vs. Communities in the Making; Knowledge of Possession vs. Knowing in Practice; Mid Level Social Theory vs. Micro Learning Theory; Motivated Members vs. Unwilling Subjects. In sum, we believe that community of practice is not likely to be forced, but is emerging, and designers need to be aware of the characteristics of existing communities of practice to nurture them.

## **Introduction**

The field of Instructional Technology has a long tradition of design to support learning, using both soft technology (e.g., coaching or mentoring) and hard technology (e.g., computer-assisted instruction). A new commercial communications technology is released in the marketplace, and then within a few years the scholarly journals develop a series of claims, and some preliminary data, about the potential for teaching and learning. Current enthusiasm that a community of practice (CoP) would be a compelling tool to support learning in organizations is well beyond empirical evidence and is inconsistent with related theory for nurturing CoPs. The major assumption of this chapter is that there is a historic tautology in the field of educational technology that is extremely seductive and persistent. The major thesis is: the enthusiasm for online communities seems premature in the sense that the technology is the natural vehicle for CoPs.

The readers of this volume are certainly well acquainted with Lave and Wenger's (1991) and Wenger's (1998) seminal work on communities of practice. One can reasonably credit the authors with dramatically influencing both research and development efforts in an extremely wide variety of contexts. Legitimate peripheral participation in a community of practice is a compelling and relatively fresh theoretical lens on the complicated pattern of workplace learning and related identity formation. Caught up in this enthusiasm, several of the first author's students have conducted case studies examining professional business consultants, engineers, and defense lawyers. The data from these studies both confirm and extend the work of Lave and Wenger (1991) as they describe rich patterns of workplace community nurturing of professional identity formation and learning. We have become convinced that these constructs are extremely useful descriptions of the situated learning patterns prevalent in many work settings.

We began to be concerned about the potential misapplication of the constructs as we became swept up in what appeared to be the next logical step, online communities. In response to these concerns, this chapter was written. We begin by overviewing four cases and offering a brief comparison and contrast. From here, we challenge some of the theoretical optimism; instead highlighting five challenges facing the design of CoPs. Acknowledging these challenges, we finally offer an alternative design approach and a design allegory to illustrate these concepts more concretely.

### **Case Descriptions**

#### **Case 1: CoPs and Technology**

Hara (2000) completed an ethnographic study following two communities of defense lawyers. She was particularly interested in the use of communication technology among the professionals, whether it contributed to, was independent of, or detracted from productive CoP behavior. In the first group she observed seven practicing defense lawyers, who were employees of a modest-sized county in a large Midwestern state. These lawyers practiced in a collaborative fashion actively sharing their knowledge of the law with one another and other private defense lawyers in their county. They regarded themselves as "underdogs" in the judicial system, underfinanced, underpaid and not particularly appreciated by the public at large. They expressed both satisfaction and commitment to the values in the law, which provide for equal protection of all citizens. Some had left more lucrative private practices to follow a career of service mainly to the indigent. Contrary to general norms in this type of professional practice, they were relatively stable in their employment. The youngest person in service had been with the office for six years, and some of the others' service exceeded 10 years. They would spontaneously rally around a colleague with serious felony cases offering moral support, sharing stories of similar cases, and

listening to and critiquing alternate theories of defense. They would informally develop specialties in the law to provide updates to the rest of the practice on new or changing interpretations in the law. There were few physical boundaries in their offices, as they often moved from workspace to workspace dialoging with one another in an animated fashion. They were proud of their history and the respect they had gained in the for-profit legal community. While more than 70% of their clients were found guilty, they were especially satisfied with that minority of cases where innocent clients were vindicated. While continually dealing with the hostile environment of public perception, better-funded opponents, and often hostile clients they managed to find an identity in their underdog image that was sustaining and constructive. Regarding technology, they were not well enough funded to have elaborate connectivity to legal services such as Lexis-Nexis. There was one terminal in the office connected to those services. They did have a listserv provided by the state government on which they could share stories, pursue legal issues, or ask for assistance. They were very modest users of all the electronic services. They seemed to resist the services from the state reasoning that the advice was less effective and predictable than they would receive in their own practice. While they would use the standard Lexis-Nexis services when needed, they often assigned the research to legal assistants or interns.

A second practice of defense lawyers was much larger. There were sixty-five lawyers and thirty legal assistants in the office. This practice was divided into four categories ranging from least to most serious offenses. Their specialties corresponded to the structure of a court system in a much larger community than the one in the previously described county. The pay and public perception was the same as in the smaller community. The compensation was actually somewhat higher. However, the turnover for professional lawyers was about 50% annually. These lawyers

would often be recruited or find other more lucrative employment in the community as they developed their expertise. In addition, the specialization offered significantly fewer opportunities for practicing and developing a wide range of defense skills. The lawyers in the misdemeanor court could represent as many as 120 clients in a single day, merely going through pro forma protocols without much knowledge of the individuals or their circumstances. To further complicate the opportunity to form productive community relationships, the lawyers in the latter group were physically separated from the rest of the practice. Despite best efforts from leadership, there was very little community sharing between the separated units (they were in government offices about a city block apart). Some of the lawyers in the major felony and capital case portion of the practice were better supported. However, they did not achieve the level of mutual supportive behavior that was observed in the small county practice. This group of professionals was better funded, and each professional had full access to the electronic service mentioned above. The youngest and least advantaged group serving the least important misdemeanor and class D felony clients frequently used the services for community support. In an interesting turn of events, they did not interact with members of their own practice, but occasionally took advantage of the state listserv service. They would sporadically share case scenarios and ask for advice of (and offer advice to) other defense lawyers in the state. They seemed to, at some level, use this extended community to replace what was lacking in their primary practice. However, the use of the Listserv was episodic and did not seem to sustain practice as the small county practice described above. Hara did not find much support for the beneficial effects of technology. The least sophisticated, perhaps most needy group, used standard collaborative software almost as an escape from a reasonably unrewarding practice. The

most successful CoP, in terms of mutual support and productive learning behaviors, actively eschewed the use of collaborative technology.

### **Case 2: Expensive CoP**

Yi (2000) was a participant observer in a Fortune 50 company's attempt to design a CoP. This high technology company is well known for its sophisticated educational enterprises. The company routinely invests a significant proportion of its income in a variety of strategic efforts to improve learning and performance. The company leaders were well aware of Wenger's work and decided that they could increase the effectiveness and efficiency of learning by forming a CoP on the basis of a new and necessary change in engineering design practice. There was strong agreement in the leadership of design engineers that the changes in practice were important individually and collectively. The firm had a strong history of competitiveness by adopting new technology at a very rapid rate. Lead engineers were often rewarded for their responsiveness to industry challenges. To test this new concept of learning at work, the leadership of the firm assembled an impressive array of resources for the "CoP experiment."

CoP designers, technical support personnel, world-class experts in the new design technology, world-class consultants, evaluation experts, and leaders of the engineering community from across the firm were assembled and given whatever reasonable requests for communication technology they needed. A multi-month plan was put in place to transfer the knowledge of the new design technology to those portions of the firm that would most likely take advantage of the new design tools and processes. A curriculum plan was put in place where one of the best-known experts in the new design process would be made available to teach a few formal sessions, but more importantly to coach the leading engineers as they attempted to apply the new knowledge to extant problems. The curriculum plan involved some initial formal

presentations and quickly evolved to a work group activity with regular electronic meetings using NetMeeting™ and related technologies. The presenters would vary as they attempted to apply the new design technology. The expert quickly adopted a coaching role, assisting where necessary, and encouraging others to accept leadership. After some difficulties with the technology, the group settled down into a rhythm of work exploring the tools and concepts. Whereas the engineers with the most pressing relevant problems made a great deal of progress, the engineers with less relevant work problems at the time participated in a more peripheral manner.

As the work group continued, their participation began to wane as the immediate problem of acquiring the tools and concepts had been accomplished. What was interesting and unexpected by corporate leadership was that established CoP structures began to be the primary mediators of the new design process. These established CoP structures seemed to coalesce around functional specialties in the firm, although the “designed CoP” continued to support boundary activities of the kind that Wenger describes. Engineers of long standing in the firm would often share their information on the basis of known associations resulting from workplace rotation or previous common projects in the firm. The designed CoP was eventually abandoned as a project. The firm declared success concerning the objective of rapid dissemination of new design knowledge. However, the significant cost of designing such an enterprise was considered too severe when compared with the gain and the lack of permanency of the constructed social structure.

### **Case 3: Extensive Legitimate Peripheral Participation (LPP)**

Chao (2001) observed and interviewed fast rising managers in one of the nation’s larger consulting firms. She was concerned with the nature of their learning processes as they were initiated into the practice of business consulting. An employee of the firm in its educational arm,

she identified those new employees who had received initial high ratings in their regular personnel reviews. These ratings were sufficient to identify the most promising recruits of the previous two years. Her intention was to examine the dynamics of these recruits' learning processes. The firm had an established pattern of coaching and mentoring, formal training, prompt personnel reviews of new employee performance, and reasonably effective rotation of work assignments to provide both breadth and depth assignments. The success of the recruits seemed to be a function of assignments that were challenging but not overwhelming, the opportunity to provide service while being coached but not tightly managed, the determination and drive to learn new skills rapidly, and thoughtful mentoring including constructive personnel reviews. Nearly all the informants in this study attributed a substantial portion of their early success to "luck," especially luck in work assignments that were a stretch but not devastating, and luck in mentors who were supportive but not oppressive in their style of supervision. Formal training was important in some cases but uniformly a minor portion of the reported causes of success.

Chao (2001) found extensive legitimate peripheral participation as described by Lave and Wenger (1991), but little mature CoP behavior on the part of the individuals or the work groups in which they participated. This finding is consistent with Wenger's (1998) discussion of trajectories. It was as if the tacit policy of the firm was to extend the apprenticeship for at least three years while the hardest of the new recruits survived the Darwinian environment. What was interesting to this discussion was that the new recruits had access to an extensive electronic environment for sharing consulting information. The environment was designed to support collaboration, reports about consulting success and failure, employee profiles, proprietary business practices, and so forth. The virtual environment was endowed with massive sums of



money to support the infrastructure, the consultants, and more. Despite these “advantages,” this infrastructure was hardly used by the new recruits or their mentors to communicate with the recruits. This modest use of the virtual environment occurred despite special incentives and other forms of encouragement and threats by management.

#### **Case 4: Online CoP**

Haney (2002) observed work groups in one of the most technologically sophisticated firms in the world where she was a participant observer for a little more than a year. Her commission was to observe the knowledge sharing behavior of a group of professionals in the firm. She was expected to critique the group’s use of collaboration and performance support technology in a manner that would enhance the group’s performance. She was also allowed to pursue dissertation research to examine one of the most extensive support environments in the world.

The firm can support individual and collective work with an array of virtual tools that is quite unique. A work group can define itself by its own authority, construct databases of relevant documents, schedule virtual or face-to-face meetings, share individual databases, search and retrieve relevant databases from the firm’s public archives, seek help from information specialists and technical experts within the firm, and construct personal time management support tools. Additionally, they can post special tools for group decision-making, schedule online learning events, locate similar work groups, and find and reference the firm’s vision, strategic planning documents, and leadership communications relevant to their task. Multiple millions of dollars have been spent on developing and promoting the virtual environment.

The firm is generally successful and the work group observed in this study is well regarded for its productivity and its contribution to the overall success of the firm. The work

culture is highly competitive and rewards for exceptional performance are usually given to individuals rather than groups. The firm recruits top graduates of a variety of business and technical specialties that support the work of the practice. Ultimate success in the firm is achieved by reaching a level of management where financial rewards are determined by the overall success of the firm as well as individual productivity. Less than a third of those entering the firm stay with the firm after four years. By that point, the new recruits usually know whether they are likely to achieve management status. Many leave voluntarily when their future with the firm becomes well understood. This work environment still requires collaboration for success. Many business opportunities require a team of specialists and less expensive peripheral players to produce a profit. Management recognizes this tension between its reward system and the need for teamwork. Although it is not explicitly a part of the culture, it appears that the extensive investment in collaboration and productivity tools is an attempt to deal with this incongruity or tension in the firm.

As in Chao's (2001) study, there were considerable incentives for employees to explore the array of support technologies. Further, the tools were well grounded in the most contemporary theories of knowledge management, social cultural learning, and ergonomic research. Despite these advantages, Haney found the tools were not used in the patterns that most advocates of online community would expect. There were simply no discernable patterns of online CoP behavior in this setting. The occasional flurries of small group work that seemed to offer promise of maturing to online CoP behavior were often informal mechanisms lightly challenging the authority or power of management. A small group would form around an issue or theme of work practice, a flurry of productive antiestablishment rhetoric would punctuate the useful exchange, and the group behavior would fade quickly as the problem or theme was

resolved. There were many attempts to meet management's expectations about the use of tools by creating publicly observable structures that resembled formal and informal norms and standards created by trainers and consultants. Often a young manager or aspiring manager would create a forum with accompanying databases to initiate a new project or reform within the practice. These structures or frameworks would rarely be used in any dynamic fashion to negotiate meaning, share stories, or seek resolution to conflict. Especially absent were communications that reflected on the personal and group efforts and achieving professional identity. The effect seemed quite flat and sterile when contrasted with Hara's defense lawyers or Yi's established CoPs engineers working at the boundary of the designed CoP.

### **Cross-Case Discussion**

These case descriptions offer interesting contrasts in regard to the difficulty of establishing or observing CoP behavior in online environments. Hara (2000) found that the strongest CoP used collaborative technologies the least, and Haney (2003) notes that, despite elaborate, sophisticated, and expensive technology, no discernable online CoP was observed. Lave and Wenger (1991) used butchers, tailors, midwives, quartermasters, and alcoholics as their primary data set when they first introduced legitimate peripheral participation. What we find interesting, in retrospect, is this situated learning of long-standing practice. In Lave and Wenger (1991), the weakest example of a productive CoP was the butchers. The designers of this system had made an important modification to a prior practice. The introduction of formal training and the restriction of practice on economic grounds in supermarkets made the practice far more restrictive, sterile, and mechanical. There seemed to be far less negotiated meaning around a clear sense of professional identity formation. The exchanges were less about the practice of

butchers and more about the routines that created efficiency. It is not that these topics are mutually exclusive, but it is the ratio that is at issue.

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**Table 1. Cross-Case Description**

<b>Case</b>	<b>Description</b>
Case 1: CoP & Technology by Hara (2000)	The strongest CoP used collaborative technologies the least.
Case 2: Expensive CoP by Yi (2000)	All efforts were focused on design of a new CoP. Existing CoPs absorbed new design. Corporation discontinued support of new CoP
Case 3: Extensive LPP by Chao (2001)	Extensive LPP was found among younger consultants, but little mature CoP behaviors were found
Case 4: Online CoP by Haney (2003)	Despite elaborate, sophisticated, and expensive technology, no discernable online CoP was observed.

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In our experience, a healthy CoP is one in which the practitioners find personal and profound meaning in their work, as described in the four cases (see Table 1 for a summary of the cases.). Learning is often not a formal agenda, but it is a secondary outcome of becoming knowledgeable while working in the field. The lawyers in Hara's study and the engineers in Yi's naturally occurring CoPs also had these attributes. Their identity formation was deeply rooted and tacitly held in their practice. The explicit goal of these enterprises seemed to be supporting the work, and the equally important tacit goal seemed to be forming identity. They were continually challenged by the work practice; they found solace, support, and satisfaction in the intimate local long-standing traditions that were known to improve practice. We wonder about the impediments to community formation in an online environment of practitioners who do not know one another, do not practice in intimate proximity to one another and, therefore, have little incentive or opportunity to negotiate their tacit agenda, as in Haney's case (2003).

Where designers attempt to foster or create community, even in enterprises where the employer is the same for all potential members, we find resistance or benign neglect of the community infrastructure (see Chao, 2001: Extensive LPP was found among younger consultants, but little mature CoP behaviors were found, due to a lack of socio-technical infrastructure). Although the employers invest large sums of money for knowledgeable consultants and extensive software systems, we still find struggle and benign neglect or cynical participation.

### **Cautionary Notes**

These experiences have created a “return to fundamentals” motivation in our research group. We have gone back to Orr (1990), Wenger (1990), and the early examples that are often cited in support of the construct generally and as antecedents to the notion of online CoPs specifically. On the basis of these original studies and our more recent studies, we have some cautions to suggest regarding the design of online communities.

These cautions challenge the widespread enthusiasm about the CoP construct and online communities (e.g., Barab & Duffy, 2000; Cochran-Smith et al., 2000; Collison et. al., 2000; Greenspun, 2001, Kim, 2000; Preece, 2000) and problematize the construct in what we have found to be a more realistic perspective (see Kling, this issue). This analysis points to problems that should be considered before developing an online CoP. These five problems seem to account for much of the data we have collected and we find comparable ideas in the literature for most of these notions (see Table 2).

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**Table 2. List of Cautionary Notes**

<b>Cautionary Note</b>	<b>Description of problem</b>
Prescriptive vs. Description Distinction	The foundational social theory is not a warrant for designing or nurturing a CoP
Ready-Made vs. Communities in the Making	Situated learning theory has more to offer the “formed” community. Little is known about the early life cycle of CoPs. The best opportunity for online design is with formed CoPs
Knowledge of Possession vs. Knowing in Practice	CoPs are rarely centered around declarative knowledge acquisition. Rather CoPs support knowledge in action
Mid-Level Social Theory vs. Micro Learning Theory	Situated learning theory is a “middle level” social theory; mixing learning theory and related pedagogy is either an inappropriate or untested mixing of levels of theory and methodology
Motivated Members vs. Unwilling Subjects	The intentions of the community members are often subverted in “designs of” CoP

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**Problem 1: Prescriptive vs. Description Distinction**

The original CoP formulation (Lave and Wenger, 1991) is descriptive, social, middle-level theory. It is not a warrant or prescription for the construction of a CoP. While Wenger acknowledges the origins of the theory and is in many ways faithful to the original formulation, there has been a recent shift to a prescriptive posture. In the different contexts of applied theory–building, Dubin (1978) and Bruner (1966) argued that prescriptive and descriptive theories serve different purposes. They observed that the twin purposes of understanding and prediction in this context are not interchangeable. That is, a rich descriptive theory is not a warrant or recipe for the construction of certain phenomena and that a useful prescriptive theory may not provide a full understanding of the phenomena but rather a perspective on the conditions or circumstances of its applied use. While anthropologists and related social theorists do not commonly use the prescriptive/ descriptive distinction, today one may find a similar understanding in their dialogue

about pragmatic applications of their discipline (Gaver, 1996; Lassiter, 2000; Wasson, 2000; Sanday, 1998).

To apply this distinction to the current issue, Wenger's (1998) book, especially the last few chapters, may be viewed as a rich theoretical description of a fully mature and constructive CoP. In effect, Wenger seems to be defining the most complete and robust CoP that he finds plausible in his review of the literature. Since the data for such a formulation are few, we find his description to be an *interpretation* of what a fully functioning CoP could achieve. The rich set of sub-construct relationships offers the designer a set of hypotheses about diagnosing established or forming CoPs. Any interventions based on this sort of analysis would be quite speculative, because there are few, if any, empirical studies of interventions applying the theory. Although this type of analysis is certainly better than no analysis at all, it simply does not inform design efforts directly. Perhaps the best analogy of this circumstance for educators would be Gagne's (1965) early work. He originally summarized eight different genres of learning prototype research (signal, s-r, chaining, verbal association, discrimination, concept, rule, problem solving) into a hierarchical, progressive, predictive theory. The rearrangement of descriptive theory into a prescriptive format required years of additional research to achieve status as a classic design tool.

While Wenger's work is a provocative ideal to achieve and useful as a tool for dialogue between designers and client systems, it is not a recipe for construction of such phenomena. While Yi (2000) observed fully functioning CoPs, none of the attempts at design shed light on how to construct these social structures. In fact, the design efforts were weakly or negatively correlated with CoP activity. All of the fully functioning CoPs we have observed in our work and have read about in the literature were not designed. Instead, they evolved quite naturally over several years. This state of affairs does not support a traditional design posture as was seen in

Yi's (2001) or Haney's (2002) studies. Indeed, Wenger (1998, 2000) is clear about the style of design that is appropriate as warranted by his theory.

Communities of Practice are about content—about learning as a living experience of negotiating meaning— not about form. In this sense they cannot be legislated into existence or defined by decree. They can be recognized, supported encouraged and nurtured, but they are not designable reified units. Practice itself is not amenable to design (Wenger, 1998, p. 229). The problem therefore is not with what Wenger advocates but how his theory is interpreted.

### **Problem 2. Ready-Made vs. Communities in the Making**

Wenger offers little insight into the formation of CoPs. He offers no longitudinal studies of CoP formation. Wenger (1999), in an internal document, describes a kind of stylized evolution of CoPs. He offers no data about such an evolutionary process. This evolutionary pattern resembles social theorizing about organizations, such as Aplin and Cosier (1980) where an organization cycles from early problem identification and uncertainty to collective action and eventually disintegration. Such models are indebted to birth, development, and death metaphors. The issue for designers is that the evolutionary pattern of CoP development is poorly understood. The early stages of CoP development may not resemble later stages that are better understood. Therefore, it will be extremely difficult to differentiate between healthy and unhealthy development under design. An interesting analogy may be found in child and adolescent development in which there are all sorts of specialties in physical and psychological practice that have evolved because the adult model is not a useful description of early developmental stages.

The studies of Yi, (2000), Chao (2001), and Haney (2002) are particularly relevant here. Yi's organization abandoned its designed CoP after 12 months of extensive effort. Since the theory of development of CoPs is incomplete, there is very little way of knowing whether the



decision was appropriate or premature. Chao observed a group of employees frozen in a state of legitimate peripheral participation. While Wenger (1998) posits that this pattern is possible (presumably observed in the past), it is hard to determine whether this is an exception to development or one alternate development path. If this is an alternative path, it raises the issue of other alternative paths.

### **Problem 3. Knowledge of Possession vs. Knowing in Practice**

There appears to be a fundamental confusion between the epistemology of possession and the epistemology of practice among advocates of online design of CoPs. Cook and Brown (1999) writing in the social cultural learning tradition of Xerox PARC raise a series of important epistemological issues. A simplified version of their argument is that there is a fundamental qualitative difference between the epistemology of possession (the traditional approach to learning and *knowledge*) and the epistemology of practice (which deals with the interactive *knowing* that occurs in professional and work practice). There are parallel ideas in the educational literature. Nickerson (1993) speaks thoughtfully to the dilemma of collective knowing in the well-known book of readings on situated cognition edited by Gavriel Solomon. Sfard (1998) raised the issue of acquisition and participation metaphors coexisting in educational practice. Liberally paraphrasing these authors and Resnick (1998), leading theoreticians argue that knowledge and knowing epistemologies are distinct processes that require different designs to support optimal community learning. Further, our opinion is that acquisition of declarative knowledge is largely incompatible with the formation of CoP or especially online CoPs.

What these authors find in both corporate and educational designs of CoPs is a heavy emphasis on knowledge (possession or acquisition). Often we see extensive learning objectives, curriculum lists of descriptions of knowledge deficits that justify the creation of online

communities (Burroughs, 2000; Yi, 2000; Schlager, this volume). An imposed intention on community members is an arrogance of intentionality that subverts the social foundation. We argue that these justifications and corresponding designs miss the point of the CoP theory. The theory is about knowing. The theory is about the kind of thoughtful, reflective dialogues that occur between Hara's attorneys as they solve every day problems, Yi's engineers as they consider new design tools and applications, or Yanow (2000)'s flute manufactures as they collectively create world class flutes. Workers in a CoP are responding to their work environment by sharing stories, problematizing work related issues, and actively constructing their knowing processes. This process is much closer to Weick's (1995) sense-making than Gagne's learning conditions. The designs for knowing should be quite different than the designs for knowledge of possession.

Our reading of Cook and Brown (1999) and especially Sfard (1998) and Resnick (1997) is that the designs of knowing should not be sacrificed for designs of knowledge. It is the ratio that is at issue and perhaps the compatibility of the forms of expressing the two epistemologies. Thus, a CoP design could certainly entertain traditional knowledge goals and designs but the ratio of such designs would be far less. Perhaps that would resemble the practice fields described by Barab and Duffy (2000). However, our limited experience suggests, as in Yi's study and perhaps some of the data in this volume would suggest, a kind of incompatibility in mixing traditional knowledge and knowing designs. The engineers seemed to breathe an audible (virtual) sigh of relief when the style of the electronic environment moved from a classroom style to a participatory style (See also the discussion of Problem 4.) We find that the two epistemologies require different social support that is difficult to coordinate appropriately.

#### **Problem 4. Mid-level Social Theory vs. Micro Learning Theory**

There is a serious dilemma in applying a middle level social theory in combination with an individual micro learning theory. Dubin (1978) is the theoretician we find most clear on the problem of aggregating levels in theory construction and application. He argues that combining theories across levels of analysis does not necessarily produce expected results. One cannot assume individual learning aggregates in predictable fashion to become collective learning. In this situation, designers are often applying a middle level social theory of learning with prescriptive micro level theories of learning in online CoP designs. As in Problem 3, we find many mixed designs with a tilt toward knowledge objectives. To commit an injustice to Shakespeare, “Learning by another name is not necessarily learning.” There is an analogy to this type of problem among educators in the corporate world. A dominant model of evaluation of training outcomes has been addressed in Kirkpatrick’s (1998) Four Level Model. He argued that perceptions of training, learning outcomes, transfer outcomes, and results in business terms should be positively and, presumably, linearly related. Only recently have analysts understood that this is a classic case of faulty aggregation across theoretical levels of analysis, and is therefore a faulty assumption on which to build an evaluation paradigm. Individual learning may not be reliably aggregated to the level of institutional outcomes.

In some CoP design, it would appear, designers assume that learning is learning and that knowing and knowledge “fit together” in a hand-in-glove manner. The socio-cultural theorists such as Wertsch (1995), Cole (1995), Rogoff (1995), Engestrom (1987) and Lave and Wenger (1991) have certainly raised our sensitivity to social mediation of learning. What isn’t as clear is that these “forms” of learning can or should always be combined in the same vessel.

By reexamining Lave and Wenger’s examples and the work of Yi (2000), Chao (2001), and Haney (2002), a different kind of interpretation has emerged. In the study by Yi (2000), the

early attempts to teach engineers the new design concepts resembled a traditional distance education class. There were manuals, lectures, examples etc. While the “instruction” was successful at some level, the expert and the designers became painfully aware that the kind of CoP behavior they expected was obviously absent. There was a teacher-pupil ethos. When the engineers and designers moved quickly away from this pattern to agenda of professional dialogue that involved shared leadership, individual “think alouds” about possibilities and problems in application, demonstrations of personal breakthroughs and failures, etc., there were early signs of community, changes in power relationships, and even some signs of identity formation. It was as if the social expectations about traditional knowledge-building and knowing practice in this setting were largely incompatible. Chao (2001) found that fast-rising managers in the large consulting firm struggled to see a utilitarian or functional relationship between the knowledge gained in “training” and the knowing activity that was a part of their legitimate peripheral participation. Categorically, these were held as different, almost oppositional, events even though they shared the same vocabulary. Both were necessary, but they were perceived to be different, almost incompatible in the social practice of their work. Also, as reexamined in the examples in Lave and Wenger (1991) and the largely repeated examples in Wenger (1998), we noted that the technicians, flute makers, claims processors, butchers, etc. were having dialogue about their work, and learning is not distinct. They are articulating the everyday problems or dilemmas of practice. One wonders if the social dynamics typically associated with acquisition of knowledge may be incompatible with the social practice of knowing at work.

#### **Problem 5. Motivated Members vs. Unwilling Subjects**

While the CoP theoretical model has changed, some important dimensions have not been evaluated. In the vast chorus of enthusiasm about CoP theory and application there have been a

few thoughtful criticisms that should be of concern to designers. First is an appreciation of intentionality as possibly undermining member participation and second is an appreciation of the potential destructive aspects of a CoP.

Regarding intentionality, Henrickson (2000), Cantu and Willmont (1999, 2000), Fox (1999), Easterby-Smith (1998) and others express important reservations about CoP research. Cantu and Willmont express it particularly well. “....we encounter an (unacknowledged) shift or slippage from an earlier presentation of learning as praxis fashioned within a discourse of critiques to a formulation as technology conceived within a discourse of regulation and performance.” (p. 272). Our interpretation of this criticism is that there is an interesting irony in Marxist critical theory being adapted to large corporate organizational purposes. What started as recognition of the informal, non-hierarchical, social frame for considering situated learning became a tool for implementing managerial change. We see this shift as a dilemma for designers because the original articulation of the theory is being applied to a significantly different purpose. This new emphasis leads to a different social dynamic.

In terms of destructive CoPs in Yi, Haney, and Hara, there was active resistance to the espoused concept of online community. In the Yi case, an accommodation with leadership was achieved when the agenda for the engineers was given to the participants. The loss of power and participant determination of intention that shifted to designers or agents of authority may be seen in some of the chapters in this volume. The common justification for federal funding of CoPs for teachers stems from their “inadequate preparation” or “poor performance.” This asserting control over the professional intentions of teachers, while consistent with Wenger’s current position (2000) is an important deviation from the original definition of CoP by Lave and Wenger (1991): “Agents’ activities and the world (presumably of CoP) mutually constitute each

other” (p.33). The consequences for social system design or actualization of community seem dramatically changed by such a shift. We have no data about the resistance that could normally be expected about such a loss of power, but certainly teacher CoPs with dwindling participation or low participation should consider the hypothesis that their community membership has been disenfranchised.

The positive connotations of “community” have been retained while the negative or destructive aspects of community have been moved to footnotes or underrepresented by the exclusive use of positive examples. Henrickson (2000), Cantu and Wilmont (2000), Chao (2001), Haney (2002), and Hara (2000) gave us some insight to the issues associated with destructive community behavior. Chao observed what could reasonably be described as intentional hazing of new hires. A protracted period of intense, powerless apprenticeship seemed to be a part of the organizational design. Admittedly, no informants were quite willing to risk that assertion. A Darwinian conception of organizational survival was the *modus operandi* leading to 33% retention rate over three years. A reasonable amount of serendipity as well as skill seemed to determine success or failure.

In the Haney case, in another consulting firm, there was such an atmosphere of competition and corresponding lack of trust that the fleeting CoP behavior seemed to be a feeble expression of collective passive aggression. The online “practice” was often a cynical expression of resistance. As previously observed in the Hara case, the weakest and most poorly supported employees in the law office turned to an outside legal listserv service to supplement the inadequate support found inside the organization. While Wenger (1998) allows for these patterns, the emphasis recently has only been on positive or productive behavior of CoPs (Contu et al., 2000; Hendriksson, 2000). The story is incomplete, and designers are not well served by

such omissions. Designers will have both substantive issues of design as well as ethical trade-offs to consider when such destructive patterns emerge.

### **A Design Approach**

What then, is the alternative? What kind of design is possible when informed by such a complex social theory? What do this and related theories afford the designer? What use can be made of Wenger's notions of educational design? What design concepts from other fields can be applied? This approach would be more consistent with the original Lave and Wenger (1991) perspectives, especially in the matter of co-creating the intentions and interventions of such an enterprise. The general strategy would be to describe existing patterns of community learning and then co-design appropriate interventions and evaluation cycles with those constituents. While this general strategy resembles Wenger's (1998) advice, this approach would also incorporate design strategies that can be found in other social theory applications (Cole, 1995; Rogoff, 1995; Engestrom, 1987). This approach is presented in very broad strokes and would need to be developed with more precision in specific circumstances (see Table 3).

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**Table 3. Phases and strategies for designing online learning environments**

<b>Phase</b>	<b>Description</b>
1. Possible design interventions	Identify an existing community and evaluate whether design interventions would be possible and useful
2. Analysis	What are the social patterns of learning and identity formation? What are the untapped possibilities for achieving the goals of the population?
3. Design	The design process could incorporate iterative strategies such as social technical design, rapid prototyping design or user-centered design
4. Evaluation and Revision	The issue of intention is central to goal setting and evaluation. Participatory decision making is the only ethical stance possible in this social theory context

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## **Phase 1: Possible Design Interventions**

*The first phase of socio-cultural educational design would be to understand the social fabric of the community in which a design is to be considered. Cole and Rogoff, it seems, would consider social theory analysis in the Russian tradition. Rogoff (1995) would, additionally, consider the levels of apprenticeship she has articulated. Wenger (1998) would take his design CoP theory and determine the nature of CoP activity, the constellations in which these CoPs exist. All points of view are portraying the social landscape as it naturally exists. Ethnographic or ecological description would be the tools of choice (Yanow, 2000). Further, Rogoff (1995) describes graphical analysis, which, to this reader, resembles the form and structure of social activity theory analysis. The point of this early phase of design would be to recognize those social structures that currently serve the population and engage the population in determining its social learning needs and possible intentions in a new or expanded community functions. It would be a very rare circumstance in which a collective would immediately recognize and proceed to form a completely new community. More often the design would lead to a boundary intervention that facilitated communication between contemporary CoPs or facilitated the learning processes of a contemporary CoP or both. For teachers and designers the starting questions would be: What is the nature of socialization in teaching practice? What CoP activity do they engage in at the present time? Are these CoP activities connected? Do the CoP activities significantly extend beyond the geographic region of practice? If so, what are their boundary, binding, or enabling characteristics? Do the processes of the CoP(s) lead to productive professional development? Is there potential to enhance the learning processes?*

It is our assertion that design in this genre does not occur without intention of the learners and designers fully participating in the process. The very nature of the social cultural theory would argue for co-design of the intention as well as the interventions. The authors believe that



social theorists such as Sanday (1998), Gaver (1996), and Wasson (2000) would argue for an intention derived through full participation of the target population. The learners are co-designers mutually determining the purpose, value, and worth of the emergent design. We as designers of the conditions for a virtual CoP would not impose our intentions directly or inadvertently. While it is easy to agree in principle to co-design, we have found it much harder in practice (Schwen, Goodrum, & Dorsey, 1993). The volatile nature of a virtual CoP means that a large segment of the “community” is in transition, not having played a significant role in the negotiations of intention. There is a real risk of either renegotiating intention *ad in finatum* or coercing participation, thereby creating a dynamic that was not intended.

## **Phase 2: Analysis**

The analysis phase of such a design process would have at least two central themes: 1) What are the social patterns of learning and identity formation in this population? and 2) What are the untapped possibilities for achieving the goals of the population? One would face the same dilemma that Wenger (1998) faced in creating his book. While there is strength in relying on the increasing sophistication of the descriptive social cultural theories, there is not much prescriptive theoretical or practical experience in constructing interventions, even interventions that purport to modify rather than construct social structures or dynamics. We, as a profession, are not practiced social designers. We have just barely become sophisticated enough to do harm. Various analysis tools such as social network analysis, activity theory portrayal, process analysis, etc. would bring a deeper understanding to the field in which we may choose to intervene. Negotiation with the population about the nature of intervention seems both ethically and conceptually appropriate.

Wenger offers an especially fresh look at such analysis issues. He posits four dimensions of dualities or tensions in mature CoPs: participation/reification, designed/emergent, identification/negotiability and local/global (see also Barab, MaKinster, & Scheckler, this volume, for application of these dualities). These are CoP system characteristics that exist in a natural tension with one another. For example, the duality of designed/emergent expresses the tension between over- and under-design. Some elements of the CoP must emerge to fulfill the learning needs of the population. This is a natural expression of intention. On the other hand, some minimal elements or structures would be required in an online CoP to provide for the necessary baseline of communication efficacy to attract and retain community activity. This and the other tensions are dynamic in Wenger's conception and their determination would be a necessary part of the analysis study.

Wenger also argues for three infrastructures or modes for learning: architecture imagination, alignment, and engagement. These are attributes or characteristics of a mature productive CoP. Taking engagement as an example, Wenger further calls for mutuality, competence, and continuity. To continue sampling from the theory (and illustrating the complexity), mutuality has three sub-characteristics: interactional facilities, joint tasks, and legitimate boundary participation or "peripherality." Wenger's descriptive elements of a mature system become a portion of the hypothetical framework of mature construct relationships that could be considered in analyzing contemporary and developing community behavior.

Later in the same section, Wenger combines the four dimensions or tensions (participation/reification, designed/emergent, local/global, identification/negotiability) and the three infrastructures (engagement, imagination, and alignment) to create a 4 x 3 matrix for his complex description of a mature CoP. In the first author's experience of thirty years as an

instructional designer, only one theory for applied intervention comes close to this level of complexity. Engestrom (1987) and his colleagues' activity theory is as complex and equally challenging for designers to apprehend and apply. As noted above, while this is a very rich theory, it has not been well tested in application studies. Analysis in this kind of design is a speculative process of seeking hypotheses for causal links in the learning behavior of a collective. The richness of the descriptive theory does not speak to empirical experience with intervention, but offers a plausible insight that remains to be tested.

### **Phase 3: Design**

The design phase of such an ambitious process would most likely have the appearance of social technical design, rapid prototyping design or user-centered design. These design approaches often have the common characteristics of: co-design teams consisting of all affected constituents, rapid prototype development, immediate test revise cycles, simultaneous consideration of the social as well as technological determinants of behavior, and process negotiation and renegotiation with the affected constituents leading to joint ownership of the design and consequences of the design. These design practices can be unwieldy to manage and they can be informal, inelegant, and downright messy, but they do bring the designers and affected constituents to a new state of understanding and acceptance of their common goals. Our designs in the past and the designs of those we have seen in the literature often emphasize support of work processes.

Wenger is one of the first to emphasize the tacit aspect of identity formation. As he has noted, one does not design identity formation, one hopes to arrange the conditions that would support identity formation. This theoretical relationship is neither well understood conceptually nor explored empirically. Excepting the work of Nonaka (1995) and his colleagues von Krogh

et al. (2000) and Baumard (1999), the design of conditions for sharing or converting tacit knowledge is unexplored. Burton (2001) offers some insight into these sorts of relationships. Following Nonaka and Burton, the designer and her clients would need to carefully build environments of trust and caring with ample opportunities for sharing stories, metaphors, and mental models.

Creating the conditions for a healthy community would foster “productive” behaviors in the community. The community could not be expected to follow the blueprint of a social design. Interestingly, Wenger argues for “minimalist” design, allowing the communities to find their natural levels of identity and learning as a result of well-nurtured conditions. Presumably this form of minimalism refers to using the extremely complex theory as a descriptive lens for seeking causal links in the behavior of the population under consideration. The interventions that would result would be inserted, by consent, in the online CoP, tested and revised in rapid succession until a level of satisfaction is achieved with the patterns of learning behavior. Computer application designers have perfected such a rapid prototyping approach. Li (2001) offers a useful summary of rapid prototyping literature. A socio-technical approach that simultaneously considers and implements the social and technical aspects of the design may also be considered as a means of expediting the complex tensions of design (Schwen, et al., 1993; Kling, McKim, Fortuna, & King, in press).

#### **Phase 4. Evaluation and Revision**

To be consistent with the larger ethical and substantive considerations of applied social theorists (Sanday 1998; Lassiter 2000) and to honor the original Lave and Wenger (1991) formulation (see Problem 5), the intended and unintended consequences of design would need to be evaluated. Issues of consequences to aesthetics, loss of autonomy, and abuse of power as well

as the central issues of learning patterns, identity formation, and collective accomplishment would be considered. The fundamental tools would be the same tools as used in the first four phases. In fact, the so-called phases would often be indistinct or blurred. Negative consequences of the contemporary community behavior could surface in Phase 1 problem definition. The co-design process would insure that the evaluation is completed with the constituents rather than to the constituents. Negative or destructive consequences of contemporary community behavior would become part of the agenda of the community. The skilled designer could present data in a concise and neutral fashion creating a decision-making structure that allowed the community to confront their issues and reach appropriate consequences. Chao could have found a forum for the consulting company to consider the consequences of their protracted Darwinian period of legitimate peripheral participation.

Issues of ethics, treatment of employees, and high turnover costs could be presented in such a fashion to facilitate a collective, perhaps tacit, understanding of the socialization of new employees. For example, the collective decisions of federal funding agencies and local teaching hospitals place economic issues ahead of patient welfare. Interns are often required to work 36- and 48-hours shifts during which they are primarily responsible for patient care in the early morning hours. Clearly, their judgment is impaired in such circumstances and there is no doubt that patients have been harmed in such situations. This example makes the point that a social cultural design is not complete until the social consequences of learning interventions are fully considered, whether they be native to the situation or caused by design interventions.

### **A Design Allegory**

To illustrate these design concepts more concretely, the following scenario is offered as an alternative to a conventional conclusion.

We recently completed an exciting three-year project in which they were commissioned to implement an educational design involving the professional development of K-3 teachers. There was federal and state funding available to improve the performance of K-3 teachers' reading instruction.

At the same time, the State of Nirvana had experienced a dramatic decline in its standardized reading test scores. The public outcry was quite shrill. Many different explanations were offered for the decline, including a criticism of the test, high rates of immigration into Nirvana, pedagogical confusion and conflict, under-funding etc. Teacher performance was widely considered to be a significant cause of the problem by all constituents except the teachers. After some discussion with teachers, teacher educators, public leaders, and minority representatives, interested parties came together to create a teacher development proposal to take advantage of public funding. The initial agreement was to fund a demonstration teacher development activity served by a community of practice web site.

We were hesitant to accept the problem as given, and proceeded to Phase 1 analysis. The designers lobbied for time to more completely engage the local teachers and teaching leadership. They worked to locate formal and informal teaching networks. They especially concentrated on local networks that seemed to promote open, active dialogue. They were concerned with teacher groups that had reading performance problems and were actively engaged and mutually supportive. They found a number of different patterns of learning community and as expected found a number of different definitions of the "reading problem." Using focus group techniques among teachers and town meetings with interested community members, they attempted to co-define different versions of the reading problem. As the different views of the reading problem became more articulate, partially motivated by federal funding, they encouraged the teacher

leadership to find a common structure for communicating the problem definition process. This included use of the web site provided by the designers. They were sensitive to the vagaries of funding as well. A useful simplification of the number of problems occurred in time to meet funding deadlines. Throughout this process of problem definition, the designers eased themselves out of leadership roles and assumed the role of facilitators.

The teacher leaders and funding authorities imitated a round of funding analysis projects. Teacher groups in the local community could propose a funded project that would further define their analysis of the local reading problem. They could seek assistance from university, state, and regional authorities in framing the analysis. Four projects representing a reasonable cross-section of teacher opinion emerged. All the while the designers collected relevant data, provided connections to outside experts, supported internal dialogue, located regional and national projects that were comparable and supported the communication that resulted from these efforts on the web site. Regarding the local activists, they were especially concerned with teacher groups in their schools. They observed meetings, classrooms, lunchroom conversations, and parent-teacher interactions to find the salient forms of problems and related communication to relocate some of the communication where possible to the web services. As the analysis phase was completed, the teachers in combination with university and regional experts produced a number of analytic documents to address the K-3 reading performance issues. Each document included a local action plan. This process naturally moved or evolved to the web as the local activists had now come to find most relevant data they needed on the web.

In a second round of funding, the implementation grant forms and related instructions were only available on the web. By this time a reasonable amount of daily chat could be observed with lively discussions of different points of view, sharing of ideas, professional

socialization, and random chatter. The designers facilitated this process in an unobtrusive fashion. The next round of proposals for implementation projects had just a few constraints: (1) the interventions dealt with teacher-teacher collaboration, teacher-student interaction, and teacher-family transactions, and (2) the standard for evaluating success had prior approval of the teacher leadership and the federal authorities. The process of intervention was open to public inspection mostly by using web tools but also by controlled visitation. The designers began to facilitate cross-project comparisons, teacher-parent interactions, and federal school interactions on the web. The designers also created a rapid response team that supported all the implementation projects, some of the instruction as well as the more extensive dialogue among teachers, parents, and peripheral participants. The rapid response team included a call center for technological support, guaranteed 24-hour modifications to instructional and communication bugs, and “rapid” analysis of important communication and instructional dilemmas from a conceptual point of view. The designers were socio-cultural analysts on demand.

There were rewards for success in performance improvement. About half of the implementation projects were refunded. New project proposals were also accepted in the second and third years of the project. In the last year of the project, grant leaders commissioned a group of educational anthropologists to evaluate the project. They found mixed results in the improvement of reading performance with lessons learned in both the successful and unsuccessful projects. They found some unintended negative consequences for some minority students involving technology access from the students and parents. They recommended solutions that were funded locally. In a footnote, they explained that the process of reform was well served by excellent democratic communication, including the local web service.



In conclusion, we have presented cautionary notes to designers who are sometimes over-enthusiastic about building online CoPs. We illustrated that descriptive theories including Lave and Wenger (1991), Orr (1996), and Wenger (1998) could provide insights to analyze established CoPs. However, we need to further examine the hypothesis of the life-cycle of CoPs in order to facilitate earlier stages of CoPs.

## Bibliography

- Aplin, J.C. & Cosier, R.A. (1980). Managing creative and maintenance organizations. *The Business Quarterly*, Spring 56-63
- Barab, S. A. & Duffy, T. (2000). From practice fields to communities of practice. In D. Jonassen S.M. Land (Eds.), *Theoretical foundations of learning environments* (pp. 26-56). Mahwah, N.J. Lawrence Erlbaum Associates.
- Baumard, P. (1999). *Tacit knowledge in organizations*. London: Sage Publications.
- Bruner, J.S. (1966). *Toward a theory of instruction*. Cambridge, MA: Harvard University Press
- Burton, C. L. (2001). *Knowledge Transfer in a Corporate Setting: A Case Study*. Unpublished doctoral dissertation. Indiana University, Bloomington.
- Burroughs, R. (2000). Communities of practice and discourse communities: Negotiating boundaries in NBPTS Certification. *Teachers College Record*, 102(2) 344-375
- Chao, C. A. (2001). *Workplace learning as legitimate peripheral participation: A case study of newcomers in a management consulting organization*. Unpublished doctoral dissertation. Indiana University, Bloomington.
- Cochran-Smith, M. & Lytle, S.L. (1999). Relationships of knowledge and practice: Teacher learning in communities. In A. Iran-Nejad & P.D. Pearson (Eds.), *Review of Research in Education* (pp. 249-303). American Educational Research Association: Washington D.C.
- Cole, M. (1995). Socio-cultural-historical psychology: some general remarks and a proposal for a new kind of cultural-genetic methodology, In J. V. Wertsch, P. del Rio, & A. Alvarez, *Sociocultural Studies of Mind* (pp. 187-214). New York: Cambridge University Press.
- Collison, G., Elbaum, B., Haavind, S. & Tinker, R. (2000). *Facilitating online learning: Effective strategies for moderators*. Madison, WI: Atwood Publishing.
- Cook, S. & Brown, J.S. (1999). Bridging epistemologies: The generative dance between organizational knowledge and organizational knowing. *Organizational Science*, 10(4), 381-400.
- Contu, A. & Willmont, H. (1999). Learning and practice: Focusing on Power Relationships. Paper presented at the *Society for Organizational Learning*, Cambridge, MA.
- Contu, A. & Willmont, H. (2000). Comment on Wenger and Yanow. Knowing in Practice: A 'Delicate Flower' in the organizational learning field. *Organization*. 7(2) 269-276.

- Di Cagna, J. (2001) Wenger-Etienne-Interview: Community organization. *Information Outlook*, 5(7) 6-12
- Dubin, R. (1978). *Theory Building*. New York: The Free Press, Macmillan.
- Easterby-Smith, M., Snell, R., & Gherwidi. S. (1998). Organizational Learning: diverging Communities of Practice? *Management learning* 29(30), 258-72.
- Engestrom, Y. (1987). *Learning by expanding*. Helsinki: Orienta-konsultit.
- Fox, S. (1999). 'Communities of practice Foucault and Actor Network Theory,' *Proceedings of Organisational Learning Third International Conference*, Lancaster University, 397-417.
- Gaver, W.W. (1996). Affordances for interaction: The social is material for design. *Ecological Psychology*. 8(2), 111-129.
- Gagne, R. (1965). *The conditions of learning*. New York: Holt Reinhart & Winston.
- Greenspun, P. (2002, January 28). Building online community. [Online]. Available at <http://www.Arsgita.com/books/building-community/>
- Haney, D. (2003). *Knowledge Management in a Professional Service Firm*. Unpublished manuscript, Indiana University, Bloomington.
- Hara, N. (2000). *Social construction of knowledge in professional communities of practice: Tales in the courtrooms*. Unpublished doctoral dissertation, Indiana University, Bloomington.
- Henricksson, K. (2000). When communities of practice came to town: On culture and contradiction in emerging theories of organizational learning. *Institute of Economic Research Working Paper Series*. Lund University, Lund, Sweden.
- Kim, A. J. (2000). *Community building: secret strategies for successful online communities on the web*. Berkley, CA Peachpit Press.
- Kirkpartick, D. (1998). *Evaluating training problems: The four levels* (2nd ed.). San Francisco: Berrett-Koehler Publishers.
- Kling, R., McKim, G., Fortuna, J., & King, A. (in press). A bit more to IT: Scientific Communication forums as socio-technical interaction networks. *Journal of American Society for Information Science & Technology*.
- Lave, J. (1997). The culture of acquisition and the practice of understanding. In D. Kirshner & J. A. *Situated Cognition: Social semiotic, and psychological perspectives*, (pp. 37-56). Mahwah, NJ: Lawrence Earlbaum Associates
- Lave, J. & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. New York: Cambridge University Press.

- Lassiter, E. (2000) Engaging in localized public anthropology. *Anthropology News*, 42(2), 7-8.
- Li, S. (2001). *Contingent scaffolding strategies in computer-based learning environment*. Unpublished doctoral dissertation. Indiana University, Bloomington.
- Nardi, B. (1996) (Ed). *Context and consciousness: Activity theory and human-computer interaction*. Cambridge, MA: The MIT Press.
- Nickerson, R.S. (1993). On the distribution of cognition: some reflections, In G. Solomon ed. *Distributed Cognitions: Psychological and educational considerations*. New York: Cambridge University Press
- Nonaka, I. & Takeuchi, H. (1995). *The knowledge creating company*. New York: Oxford University Press.
- Orr, J.E. (1990) Sharing knowledge, celebrating identity: community memory in a service culture. In D.S. Middleton & D. Edwards (Eds.) *Collective remembering: memory in society*, (pp. 169-189). Beverly Hills, CA: Sage
- Passmore, W. (1978)(Ed.). *Sociotechnical systems: a sourcebook*. LaJolla,CA: University Associates.
- Preece, J. (2000). *Online Communities: Designing usability, supporting sociability*. Chichester, UK: John Wiley and Sons.
- Reil, M. (2001, April). Models of Community Learning and Online Learning in Communities, Paper presented at *American Educational Research Association*, Seattle, WA.
- Resnick, L.B. (1987). Learning in school and out, *Educational Researcher*, 16, 13-20.
- Rogoff, B. (1995). Observing sociocultural activity on three planes: participatory appropriation, guided participation, and apprenticeship, In J. V. Wertsch, P. del Rio, & A. Alvarez. *Sociocultural Studies of Mind*, (pp. 139-164). New York: Cambridge University Press.
- Sanday, P. (1998) *Opening statement: Defining public interest anthropology*. [Online]. Available: <http://www.sas.upenn.edu/~psanday/pia.99.html>
- Schwen, T. M., Godrum, D. A., & Dorsey, L. T. (1993). ON the design of an Enriched Learning and Information Environment (ELIE). *Educational Technology*, 33 (11), 5-9.
- Sfard, A. (1998). On two metaphors for learning and the dangers of choosing just one, *Educational Researcher*, 27, 4-13.

- von Krough, G., Nishiguchi, T., & Nonaka, I., (2000). *Enabling knowledge creation: how to unlock the mystery of tacit knowledge and release the power of innovation*. New York: Oxford University Press
- Wasson, C. (2000). Ethnography in the field of design, *Human Organization*, 59 (4), 377-389.
- Weick, K.E. (1995). *Sensemaking in organizations*. Thousand Oaks, CA: Sage Publications
- Wenger, E. (1990). *Toward a theory of cultural transparency: elements toward a discourse on the visible and invisible*. Unpublished doctoral dissertation. University of California, Irvine.
- Wenger, E. (1998). *Communities of Practice: Learning, meaning, and identity*. Cambridge, MA: Cambridge University Press.
- Wenger, E. (1999). *Communities of practice: Stewarding knowledge*, Internal document: P.O. Box 810, North San Juan, CA 95960. USA.
- Wenger, E. (2000) Communities of practice and social learning systems, *Organization*, 7(2) 225-246.
- Wertsch, J. (1995) The need for action in sociocultural research, In J. V. Wertsch, P. del Rio, & A. Alvarez. *Sociocultural Studies of Mind*, (pp. 56-74). New York: Cambridge University Press.
- Yanow, D. (2000) Seeing Organizational Learning: A 'Cultural' View, *Organization* 7(2) 247-268.